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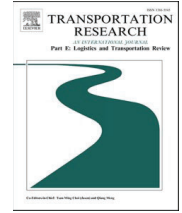
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Board structure and financial performance in the logistics sector: Do contingencies matter?

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ABSTRACT

Drawing on agency, stewardship, and contingency theories, this study examined whether board structure is associated with corporate financial performance and—if so—whether firm size and leverage (i.e., contingencies) moderate this association in the logistics sector. Hence, the study aimed to provide implications for board configuration and performance enhancement at varying levels of firm size and leverage. The data were retrieved from the Thomson Reuters Eikon database, and the generalized method of moments (GMM) estimator was applied to these data. The results revealed that while independent directors augment corporate financial performance, female directors and chief executive officer (CEO) duality do not. The first moderation analysis concerning firm size indicated that women drive firm performance in neither large nor small firms with the exception of sales revenues, which they improve in large firms. Independent directors, on the other hand, were shown to drive firm performance in larger firms. CEO duality was revealed to be particularly influential in boosting sales revenues in large logistics firms. The second moderation analysis detected no disciplinary effect of leverage on board structure in the logistics sector. Based on the findings, theoretical, managerial, and policymaking implications are suggested for the logistics sector.

1. Introduction

The logistics sector has become a major economic sector with an essential role in national and international trade and, hence, in the economic growth of countries (Kabak et al., 2020). The Council of Supply Chain Management Professionals¹ (2013) defines logistics as “the process of planning, implementing, and controlling the efficient flow and storage of goods, services, and related information from the point of origin to the point of consumption to meet customers’ requirements.” Logistics includes a complete set of integrated activities, such as packaging, transportation, warehousing, distribution, reverse logistics, and waste management, that contribute to

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¹ Formerly named the Council of Logistics Management.

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national development (Baah et al., 2021). In recent decades, logistics service providers have faced significant challenges due to intense competition, low profit margins (Hausmann et al., 2021), increased environmental requirements (Kannan et al., 2023), and increasing customer expectations for higher-quality services at lower costs (Kiesel et al., 2017). At the macro level, governments build transportation and logistics infrastructure and develop and impose efficient transport regulations to improve logistics operations, which, in turn, foster the competitiveness, efficiency, and performance of the logistics sector (Kabak et al., 2020). At the micro level, logistics companies can strengthen their corporate governance (CG) structure to improve organizational efficiency and performance. The adoption of strong CG codes would help governments establish a transparent and efficient legal system (Chang et al., 2022) and enhance the quality of public governance (Uyar et al., 2021a), thereby fostering competitiveness and improving performance in the logistics sector at the national level.

Agency theory suggests that corporate boards are important governance mechanisms in that they control and monitor company management (Jensen & Meckling, 1976) and reduce agency costs (Fama & Jensen, 1983), which could influence firm performance in terms of financial outcomes. For instance, board independence strengthens board monitoring (Fama & Jensen, 1983) and enhances the quality of board decisions. Board gender diversity also influences board efficiency (Terjesen et al., 2016) and positively impacts organizational performance (Barnhart et al., 1994). In contrast, dual chief executive officers (CEOs) can reduce workforce diversity, neglect employee welfare, and damage career development opportunities, which could in turn hamper the financial sustainability of the logistics sector in the long run (Fernandes et al., 2023). Logistics companies should thus create well-functioning boards with independent, competent, and diverse members in order to gain a competitive edge and augment their operational and financial performance. As firm-level logistics performance is crucial to the performance and development of the sector as a whole, ineffective boards would not only impede the performance of organizational logistics but also adversely affect the performance of logistics at the national level. Given the critical role played by the logistics sector in the competitiveness of other sectors, such as agriculture, finance, manufacturing, and tourism (Barut et al., 2023), in attracting foreign direct investment (Hong, 2007; Suki et al., 2021), and in the economic growth of countries (Khan et al., 2019; Kabak et al., 2020; Saidi et al., 2020; Suki et al., 2021; Chang et al., 2022), it is important to identify board-level factors that impact the corporate financial performance (CFP) of the logistics sector. However, only a few studies have focused on understanding the role of boards in the financial performance of the logistics sector (Sheikh & Alom, 2021). The motivation underlying the current study was to address knowledge deficiencies in the relevant literature by examining whether board structure (BS) is a significant driver of CFP in the logistics sector.

Prior research investigated the association between BS and CFP by focusing on a particular sector (Belkhir, 2009; Bhatt & Bhattacharya, 2015; Xu et al., 2016; Nepal & Deb, 2021; Tam et al., 2021). However, the findings of these studies are not generalizable to the logistics sector at large because the selection and appointment of board members as well as board composition and structure vary between sectors. Logistics is a geographically diverse industry covering a wide variety of stakeholders, such as customers, governments, employees, suppliers, and society (Jadhav et al., 2022), with a CG context that differs from that of other sectors. Furthermore, as the number of female employees in logistics companies is significantly low relative to other sectors, the number of female directors on boards in the transportation and logistics sectors is also low (Govindan et al., 2021; Shakil et al., 2022).² Research has shown that gender inequality is harmful to logistics performance (Larson, 2020), in turn underscoring the value of women in the workforce and as board members in the logistics sector. The World Economic Forum (2023) highlighted the importance of improving gender equality in the logistics sector by drawing attention to the underrepresentation of women in the sector. PwC (2012) published a study³ in which it was demonstrated that firms achieve higher profits when women occupy top roles. While a growing field of research is examining the relationship between board gender diversity and corporate social and environmental performance in the logistics sector (Fernandes et al., 2023; Govindan et al., 2021; Kuzey et al., 2022; Shakil et al., 2022), the potential relationship between board gender diversity and CFP in this sector has yet to be investigated. Accordingly, the present study explored this potential relationship considering contingencies' role.

A review of the existing literature revealed that the association between board gender diversity and CFP remains theoretically and empirically uncertain. The extant literature also reported mixed and contradictory findings on the link between board independence and CEO duality and CFP. For example, in their literature review, Hermalin and Weisbach (2003) showed that board independence does not have a significant impact on CFP and firm value. As the direct link between BS and CFP is ambiguous, the moderating role of various firm characteristics can be tested to understand whether—and if so, how—BS influences CFP. In this sense, a contingency approach is needed to evaluate the factors impacting the link between BS and CFP. However, the role of contingencies in the relationship between BS and CFP has been mostly neglected in prior research (Li & Chen, 2018). The present study addressed this gap by exploring whether—and if so, how—contingencies (i.e., firm size and leverage) impact the link between BS and CFP in the logistics sector.

Thus, first, this study investigated the association between board characteristics (board gender diversity and independence and CEO duality) and CFP (firm value, profitability, and sales performance) in the logistics sector. Second, the study analyzed the moderating impact of firm size and leverage on the link between board characteristics and CFP to determine whether contingencies impact this link.

² Govindan et al. (2021) and Shakil et al. (2022) reported the percentage of female members on boards in the logistics sector as 11.49% and 11.16%, respectively.

³ PwC publishes a Transportation & Logistics 2030 series in which several sectoral issues are discussed with experts from the transportation and logistics sectors using the Delphi methodology. The fifth volume of this series deals with the question of what transportation and logistics firms can do to address talent issues and improve their human resource management.

This study makes four primary contributions to extending our comprehension of the relationship between BS and CFP in the logistics sector. First, some studies have explored the factors associated with logistics performance at the macro scale (Kabak et al., 2020; Larson, 2020). Other studies have concentrated on the effect of a set of country- and firm-level factors (i.e., geographical location, size) on organizational performance and efficiency in the logistics sector (Liu & Lyons, 2011; Ferrari et al., 2018; Tsouknidis, 2019; Drobetz et al., 2021; Singh et al., 2022). Although the role of board attributes in corporate social responsibility (CSR) activity (Chien, 2023; Fernandes et al., 2023; Govindan et al., 2021; Kuzey et al., 2022; Shakil et al., 2022) is being increasingly researched, the link between board-level factors and CFP in the logistics context remains under-explored (Andreou et al., 2014; Sheikh & Alom, 2021). Our study contributes to the literature by investigating the association between BS and CFP in the logistics sector. Second, prior studies on the link between BS and CFP usually examined a single country (Rose, 2007; Liu et al., 2014; Shehata et al., 2017; Ahmadi et al., 2018; Fan et al., 2020; Mishra, 2020; Wu & Dong, 2021; Arora, 2022; Pandey et al., 2022) or a certain region (Ramdani & van Witteloostuijn, 2010; Low et al., 2015; Marquez-Cardenas et al., 2022), thereby limiting the generalizability of their findings. In contrast, the current study analyzed the association between BS and CFP at a global scale using a comprehensive sample of logistics companies from 40 countries. Third, few studies have generated evidence on the link between BS and CFP in different sectors, such as banking (Belkhir, 2009; Tam et al., 2021), manufacturing (Goh et al., 2014), restaurants (Guillet et al., 2013), and tourism (Lee and Thong, 2023). The current study expands this research by providing sector-specific insights into the association between BS and CFP. Fourth, the present study was the first to demonstrate the significant impact of contingencies on the association between BS and CFP in the logistics context. Lastly, the outcomes of this study have useful implications for managers as well as policymakers.

The next section reviews past literature on BS and CFP. The third section outlines the theoretical foundations of the study and its hypotheses, after which, in section four, the research methodology is explained. The results of the study are reported in section five, after which, in section six, a discussion of the findings is presented and some conclusions are drawn. In the last section, the implications of the study are provided, as well as its limitations, and future research avenues are discussed.

2. Literature review

One strand of research has investigated the association between numerous board attributes, such as board diversity (Carter et al., 2010; Low et al., 2015; Shehata et al., 2017; Duppati et al., 2020), board independence (Lefort & Urzúa, 2008; Liu et al., 2015; Malik & Makhdoom, 2016; Hamdan & Al Mubarak, 2017), CEO duality (Kang & Zardkoohi, 2005; Bhagat & Bolton, 2008; Lam & Lee, 2008; Ramdani & van Witteloostuijn, 2010; Peni, 2014; Hsu et al., 2021) and CFP. For instance, Carter et al. (2003) and Erhardt et al. (2003) analyzed the link between board diversity and firm value and profitability, respectively, and reported that board gender diversity is significantly related to enhanced CFP. In a similar vein, Low et al. (2015) explored the relationship between the presence of females on boards and CFP in the Asian context and determined that a greater number of female directors on boards leads to better financial outcomes. Other studies have also documented a positive link between board gender diversity and CFP in different contexts, such as Australia (Galbreath, 2018), India and Singapore (Duppati et al., 2020), the UK (Brahma et al., 2021), and Turkey (Kılıç & Kuzey, 2016). Contrary to prior studies, Rose (2007) found no significant link between board gender diversity and CFP in the Danish context. Furthermore, Shehata et al. (2017) found a negative association between the presence of women directors on boards and CFP in small- and medium-sized enterprises (SMEs) in the UK. With regard to board independence, while some studies found a positive impact of independent board members on CFP (Lefort & Urzúa, 2008; Lei & Song, 2012; Liu et al., 2015), others documented negative effects (Hamdan & Al Mubarak, 2017; Dang et al., 2018; Shan, 2019; Fan et al., 2020; Mishra, 2020). Furthermore, prior literature has generated inconsistent findings on the association between CEO duality and CFP (Boyd, 1995; Ramdani & van Witteloostuijn, 2010; Peni, 2014; Ahmadi et al., 2018; Pucheta-Martínez & Gallego-Álvarez, 2020).

The aforementioned studies clearly demonstrated that the existence of a direct link between board composition and CFP is uncertain. The effectiveness of CG mechanisms is more likely to be contingent on several contextual factors (Elsayed & Wahba, 2013). In that sense, the contingency approach argues that the analysis of moderating factors with respect to the relationship between BS and CFP could provide insights into the role of board composition in improving CFP. However, few studies have explored the moderating impact of external factors, such as the institutional context (Uribe-Bohorquez et al., 2018), the quality of national governance (Nguyen et al., 2021), and environmental uncertainty (Boyd, 1995), and internal factors, such as board size (Ramdani & van Witteloostuijn, 2010), board independence (Duru et al., 2016), firm size (Li & Chen, 2018), ownership structure (Cho & Kim, 2007), blockholding outside directors (Tang, 2017), and family ownership (Lam & Lee, 2008; Leung et al., 2014), on the link between board characteristics and CFP. This lack of research justifies the analysis of the role of contingencies (i.e., firm size and leverage) in the association between BS and CFP.

In the prior literature, factors associated with logistics performance at the macro level have been examined (Kabak et al., 2020; Larson, 2020; Uyar et al., 2021a). Several studies have explored the impact of a variety of firm-level factors on firm performance and efficiency in the logistics sector (Liu & Lyons, 2011; Ferrari et al., 2018; Tsouknidis, 2019; Drobetz et al., 2021; Singh et al., 2022). In terms of CG, Tsouknidis (2019) and Drobetz et al. (2021) analyzed the association between institutional ownership and CFP in the shipping industry. Although there are an increasing number of studies on the role of board diversity in driving CSR-related issues, such as CSR performance (Govindan et al., 2021), corporate environmental and social performance (Shakil et al., 2022), social sustainability (Fernandes et al., 2023), and eco-friendly initiatives (Kuzey et al., 2022), few studies have investigated the impact of BS on CFP in the logistics context (Andreou et al., 2014; Sheikh & Alom, 2021). A study by Sheikh and Alom (2021) investigated the link between BS and CFP in the Bangladeshi shipping sector, documenting insignificant effects of board characteristics on firm performance, except with regard to board leadership. More specifically, Andreou et al. (2014) examined the association between CG with financing decisions and CFP in maritime firms, revealing significant impacts of board characteristics on financing decisions and CFP. It should be

noted that these previous studies were restricted to the maritime industry and none of them specifically examined the impact of board gender diversity on CFP. Additionally, the moderating impact of firm size and leverage on the link between BS and CFP has not yet been explored in the logistics sector. Accordingly, the current study addressed these gaps in the extant research by analyzing the impact of board-level factors, including board gender diversity and independence and CEO duality and CFP, in the logistics context, covering many sub-sectors of logistics⁴ and considering the role of contingencies with an exclusive focus on the logistics sector.

3. Theories and hypotheses

Agency theory is one of the most widely used theories to understand the relationship between BS and CFP (Carter et al., 2003). Agrawal and Knoeber (1996) argued that principal–agent problems arise because managers are likely to pursue their own interests at the expense of shareholders. From the perspective of agency theory, boards are important mechanisms in controlling and monitoring managers (Jensen & Meckling, 1976), mitigating conflicts between agents (shareholders) and principals (managers), and decreasing agency costs (Fama & Jensen, 1983). Thus, BS is considered to be related with board effectiveness and CFP. Drawing on agency theory, the present study examined whether—and if so, how—board independence, board gender diversity, and CEO duality impact CFP in the logistics context.

3.1. Board gender diversity

Past literature documented several advantages of female representation on a board. First, should females add a new, value-enhancing perspective to the board, they will be associated with increased shareholder value (Farrell & Hersch, 2005). Second, female board members behave differently than male board members as they have better attendance records (Adams & Ferreira, 2009). Third, board diversity increases creativity (Miller & Del Carmen Triana, 2009) and enables effective decision-making and problem-solving (Carter et al., 2003). Fourth, diversity enhances board independence as people with different cultural backgrounds or genders might think “outside the box” (Carter et al., 2003). Therefore, as the appointment of women directors enhances the heterogeneity of the board, boards with a greater number of female directors will act more independently and hence be more effective in mitigating agency problems. Fifth, today, companies operate in a more diverse environment and must manage that diversity to survive (Miller & Del Carmen Triana, 2009). Stakeholder theory states that board gender diversity helps companies to better understand the diverse marketplace (Carter et al., 2003) and to effectively manage relations with their stakeholders (Shehata et al., 2017). By contrast, several disadvantages of gender-diverse boards have also been documented in the prior literature, an example of which is the tendency for heterogeneous teams to experience more conflicts, which may in turn result in slower decision-making (Hambrick et al., 1996), and to marginalize board members, which may hinder the effectiveness of board monitoring (Carter et al., 2003). Additionally, Campbell and Mínguez-Vera (2008) stated that if the appointment of women directors is driven by societal concerns for greater gender equality rather than by their qualifications, their presence on boards may have negative impact on CFP.

Accordingly, the results of prior empirical research on the relationship between board gender diversity and CFP are inconclusive, as these studies generated positive (Carter et al., 2003; Liu et al., 2014; Low et al., 2015; Terjesen et al., 2016; Duppatti et al., 2020; Brahma et al., 2021; Arora, 2022), insignificant (Farrell & Hersch, 2005; Marinova et al., 2016), or even negative associations (Reguera-Alvarado et al., 2017; Shehata et al., 2017). In line with the perspective suggesting a positive link between board gender diversity and CFP, we proposed the following hypothesis (H):

H1: Board gender diversity and CFP (firm value, profitability, and sales) are positively associated.

3.2. Board independence

Agency theory suggests that independent board members perform an important role in mitigating conflicts between managers and shareholders (Agrawal & Knoeber, 1996), reducing agency costs (Mobbs, 2013), effectively controlling managers (Fama & Jensen, 1983), restraining the self-interested activities of management (Agrawal & Knoeber, 1996), strengthening the monitoring of dominant shareholders (Goh et al., 2014), and improving transparency in corporate decision-making processes (Malik & Makhdoom, 2016). The board must balance management decisions with the expectations of stakeholders and shareholders (Uribe-Bohorquez et al., 2018). Because independent directors invest their reputational capital in the firm, they have more incentives to protect shareholder interests to maintain and improve their personal reputation (Vafeas & Theodorou, 1998). In this sense, independent board directors are more likely to make objective decisions and to play an effective role in providing a fair diversion of the firm’s assets (Lei & Song, 2012). Thus, agency theory suggests that board independence and CFP are positively associated. However, Hamdan and Al Mubarak (2017) stated that independent directors increase controlling costs and information asymmetry, reducing the expected benefits of board independence.

Prior literature on the link between independent directors and CFP documented mostly positive (Barnhart et al., 1994; Lefort & Urzúa, 2008; Lei & Song, 2012; Liu et al., 2015; Hamdan & Al Mubarak, 2017; Uribe-Bohorquez et al., 2018) but also insignificant (Goh et al., 2014) and even negative (Dang et al., 2018; Shan, 2019; Fan et al., 2020; Mishra, 2020) results. Incongruent with the arguments of agency theory, we formulated the following hypothesis:

⁴ The sample covers firms in several sub-sectors of logistics, including postal, courier, and land-based logistics, air freight logistics, marine freight and logistics, and ground freight and logistics.

H2: Board independence and CFP (firm value, profitability, and sales) are positively associated.

3.3. CEO duality

Companies mitigate principal–agent problems “by delegating the task of *decision control* to the board and *decision management* to the CEO” (Boyd, 1995, 303). CEO duality exists when the positions of the board chair and CEO are held by the same individual. There are two opposing views with respect to the link between CEO duality and CFP.

On the one hand, agency theory states that duality increases the CEO’s power over the board and management, impeding the independence between the management and the board that is needed to monitor and control management decisions and activities (Fama & Jensen, 1983). In this context, the consolidation of power in the same person may entrench his or her position (Kang & Zardkoohi, 2005), foster abuse of power (Ramdani & van Witteloostuijn, 2010), and hinder checks and balances (Ramdani & van Witteloostuijn, 2010), which may increase agency costs and adversely affect future CFP. Accordingly, Bhagat and Bolton (2008) and Dang et al. (2018) documented a negative impact of CEO duality on CFP. Thus, when CEO and board chairperson roles are combined, the board acts less effectively in monitoring the management, resulting in decreased financial performance. Incongruent with the agency theory perspective, we developed the following hypothesis:

H3a: CEO duality and CFP (firm value, profitability, and sales) are negatively associated.

In contrast, stewardship theory posits that directors and managers are good stewards of the resources assigned to them, as they are trustworthy individuals (Donaldson & Davis, 1991). Furthermore, non-financial benefits, such as recognition and job satisfaction, can motivate managers in addition to financial benefits (Lam & Lee, 2008). This theory suggests that managers would not risk their reputation by acting against the interests of owners (Lam & Lee, 2008).

According to stewardship theory, combining the positions of CEO and board chair in the same person may facilitate clear and strong leadership (Ramdani & van Witteloostuijn, 2010), stimulate the formulation and implementation of more consistent strategies (Ahmadi et al., 2018), result in faster responses to external events (Boyd, 1995), and facilitate more effective strategic decision-making (Kang & Zardkoohi, 2005). Thus, stewardship theory assumes that firms with CEO duality perform better than those without CEO duality. Empirically, Peni (2014) and Ahmadi et al. (2018) documented that CEO duality positively impacts CFP. Incongruent with stewardship theory, we formulated the following hypothesis:

H3b: CEO duality and CFP (firm value, profitability, and sales) are positively associated.

3.4. Firm size

Contingency theory posits that there is no single best way of acting since the effectiveness of a given structure is impacted by contingency factors (Birkinshaw et al., 2002). The contingency approach argues that the impact of BS on CFP may be positive, insignificant, or negative depending on the prevailing circumstances at the time (Carter et al., 2010). Firm size, for instance, can be a contingency factor that moderates the relationship between BS and CFP because it is a significant determinant of board composition and diversity (Carter et al., 2003). More specifically, firm size is associated with greater female board representation (Carter et al., 2003), which may in turn eliminate the issue of tokenism and improve the value-enhancing role of female directors. Larger firms may be more profitable due to their greater market power and higher efficiency gains (Lee, 2009), suggesting a stronger positive association between BS and CFP. Zona et al. (2013) determined that firm size moderates between BS and firm innovation. Congruent with the contingency approach, we expected that firm size would positively moderate the BS–CFP relationship. Thus, we formulated the following hypothesis:

H4: Firm size positively moderates the association between BS and CFP.

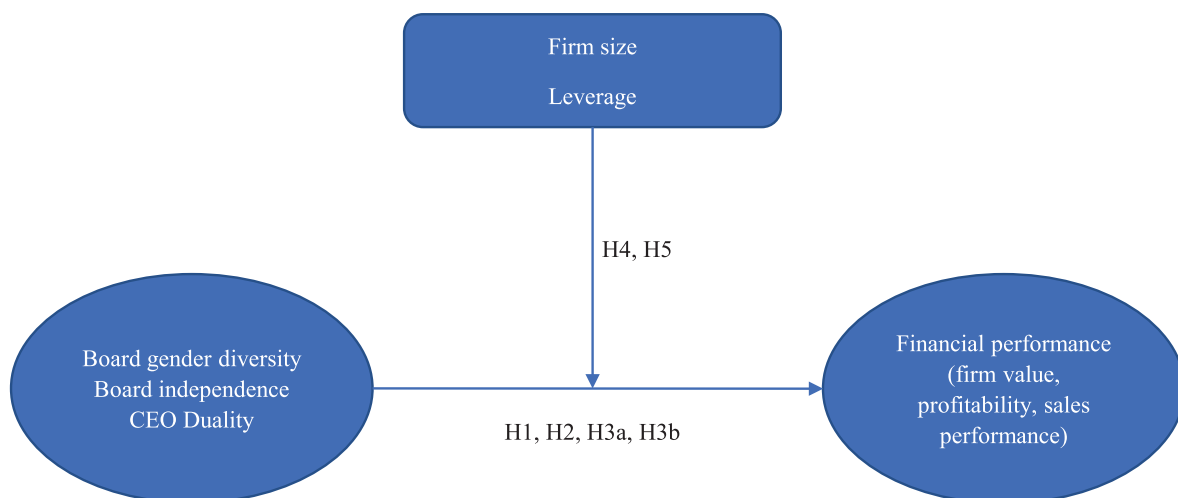


Fig. 1. Theoretical structure of the study: Left box shows board characteristics; top box lists moderators; right box outlines CFP metrics.

3.5. Leverage

Leverage can also be a contingency factor that influences the association between BS and CFP. When agency problems exist between managers and shareholders, these may be attributable to managers using cash flows to invest in projects that do not contribute to shareholder wealth (De Jong, 2002). Jensen (1986) stated that company managers with substantial free cash flows and no valuable investment opportunities voluntarily increase leverage as a bonding instrument. Therefore, debt financing is one of several disciplinary mechanisms (Grinstein, 2006) that can be employed to solve principal–agent problems (Agrawal & Knoeber, 1996; De Jong, 2002) and constrain managers from wasting free cash flows (Chang et al., 2014). In this vein, Pandey et al. (2022) documented that female board membership and CFP are positively associated when leverage is high. As a result of the disciplinary role of leverage in managerial behavior, we assumed that the association between BS and CFP would be stronger in high-leverage firms. Thus, we developed the following hypothesis:

H5: Leverage positively moderates the association between BS and CFP.

Fig. 1 depicts the theoretical framework and hypothesized relationships of the study.

4. Research methodology

In this study, the empirical methodology included the following steps: determining the econometric models and estimation methods, identifying and compiling the data sets, cleaning and transforming the data, running the estimation models, and tabulating and interpreting the results.

4.1. Variables and statistical models

The econometric model considered in the current study related the CFP—including Tobin’s Q ratio (*TobinQ*), Return on Assets (*ROA*), Return on Equity (*ROE*), Net Profit Margin (*NetProMargin*), Sales Growth (*SlsGrwth*), Efficiency (*Effcncy*)—of logistics companies to lagged CFP and to CG features, including board gender diversity (*BrdGenDiv*), board size (*BrdSize*), board independence (*BrdIndep*), board attendance (*BrdAtten*), and CEO duality (*DualCEO*), while controlling for other company characteristics, including free float percentage (*FrFlPer*), firm size (using log-transformed total assets; *LnTotAssets* as a proxy), and leverage (*Lvrage*). Among the CG characteristics, *BrdGenDiv*, *BrdIndep*, and *DualCEO* were considered as the independent variables, while *BrdSize* and *BrdAtten* were considered as the control variables. Concerning company characteristics, *LnTotAssets* and *Lvrage* were also used as moderating variables. Previous literature—including, but not limited to, Bhagat and Bolton (2008), Tsionas et al. (2012), Wintoki et al. (2012), Andreou et al. (2014), Akbar et al. (2016), and Govindan et al. (2021)—used similar CG and firm variables in their analyses. A description of all of the variables is provided in Table 1.

The following econometric model considered the dynamic first-order model:

$$Y_{it} = \alpha Y_{it-1} + \beta_0 + \beta_1 X_{it} + \beta_2 Z_{it} + \lambda_i + \mu_t + \epsilon_{it} \tag{1}$$

where the independent variables included the lagged dependent variable. In the model, Y_{it} represents firm i ’s performance at year t , Y_{it-1} symbolizes the lagged CFP at year $t - 1$, and X_{it} and Z_{it} represent the value of the independent and control variables, respectively. In agreement with Wintoki et al. (2012), Akbar et al. (2016), and Ullah et al. (2018), the present study used dynamic panel data estimators to address the endogeneity inherent in the relationship between CFP and CG, which may be derived from simultaneity, unobserved heterogeneity–firm fixed effects, and/or dynamic endogeneity. In this context, generalized method of moments (GMM) estimators yielded consistent and unbiased estimates for the dynamic first-order model.

Table 1
Variables included in the study.

Variables	Definition	Source
TobinQ	The sum of market capitalization and total debt scaled by total assets	Authors’ computations (AC)
ROA	The ratio of net earnings (after taxes) to total assets	AC
ROE	The ratio of net earnings (before taxes) to total equity	AC
NetProMargin	The ratio of net earnings (before taxes) to net sales	AC
SlsGrwth	Year-over-year net sales growth	AC
Effcncy	The ratio of net sales to total assets	AC
BrdGenDiv	Percentage of females on board of directors	Thomson Reuters (TR)
BrdIndep	Percentage of independent board members	TR
BrdSize	Board size at the end of the fiscal year	TR
BrdAtten	Indicates whether the firm publishes board member attendance at board meetings	TR
DualCEO	Indicates the duality of board chair and CEO roles	TR
FrFlPer	Percentage of shares outstanding traded freely on the stock exchange	TR
LnTotAssets	Total assets (log-transformed)	TR
Lvrage	Total liabilities scaled by total assets	AC

4.2. Data sources

The data used in this study, including data on BS and CFP, were sourced from the Thomson Reuters Eikon database (Refinitiv, 2022a) for the years 2011–2021. This database maintains corporate fundamentals corresponding to 99% of the global market capitalization. The database encompasses more than 120 countries with 120,000 + active and inactive companies. The data are gathered from publicized financial statements, such as balance sheets, profit & loss reports, and cash flow statements. The Thomson Reuters Eikon database also stores company events, market data (Refinitiv, 2022a), and environmental, social, and corporate governance (ESG) data (Refinitiv, 2022b). CG data are retrieved from company and non-governmental organization (NGO) websites, annual reports, stock exchange filings, news sources, and CSR reports. The CG data involve 56 metrics, which are categorized into management (including structure–independence, diversity, committees, and compensation), shareholders, and CSR strategy. The scope of the ESG data, going back to 2002, covers over 12,000 companies, corresponding to 85% of the global market cap from 76 countries (Refinitiv, 2022b). The database also stores firm data for 13 economic sectors, 33 business sectors, and 62 industry groups. The logistics industry group includes postal, courier, and air freight logistics, marine freight and logistics, land-based logistics, and ground freight and logistics companies (Refinitiv, 2022c).

While the Thomson Reuters Eikon database stores fundamental information for 794 logistics companies for the 2011–2021 period, it only contains governance data for 48 companies in 2011, although this increases to 148 companies in 2020 and 57 companies in 2021. Therefore, the preliminary sample of the study included 888 firm-year observations—48 records in 2011 and 2012, 49 in 2013, 51 in 2014, 69 in 2015, 82 in 2016, 97 observations in 2017, 110 records in 2018, 129 records in 2019, 148 records in 2020, and 57 records in 2021—for which both CFP and board attribute data were available.

5. Results

5.1. Descriptive statistics

The data were preprocessed before testing the hypotheses. Following Field (2017, 432–463), two outliers from *TobinQ*, five outliers from *ROA*, six outliers from *NetProMargin*, three outliers from *SlsGrwth*, seven outliers from *ROE*, and one outlier from *Effcncy* were eliminated based on their *z*-scores (no records were eliminated listwise). Descriptive statistics of the variables are presented in Table 2. The average *TobinQ* was 1.26 (± 0.79), the average *ROA* was 3.89 (± 6.44), the average *ROE* was 12.44 (± 46.45), the average *NetProMargin* was 6.43 (± 17.03), the average *SlsGrwth* was 4.37 (± 20.90), and the average *Effcncy* was 100.59 (± 75.14). Further, while the rate of female board membership was comparatively low, at 14.10% ($\pm 13.46\%$) on average (with a maximum of 66.67%), the rate of non-executive board membership was relatively high, at 73.21% ($\pm 20.07\%$). On average, the corporate boards were governed by 9.56 (± 3.03) participants (ranging from 2 to 20 trustees). Besides, board chair and CEO duality was fairly common in logistics firms (in 41.10% of the firm-year observations). However, logistics companies rarely publish the attendance rates of board members at board meetings (only in 26.69% of the firm-year observations). Finally, the stocks of the logistics firms were observed to float freely on the stock exchange (on average, 70.82% ($\pm 25.93\%$)), the logarithm of total assets (natural)—a proxy for firm size—ranged between 17.59 and 26.53, and leverage had an average value of 59.30% ($\pm 21.89\%$).

5.2. Correlation coefficients

Spearman's correlation coefficients and their significance are displayed in Table 3. CFP variables, including *TobinQ*, *ROA*, and *ROE*,

Table 2
Descriptive statistics.

Variables	Obs.	Mean	Std. dev.	Min	Max
TobinQ	884	1.26	0.79	0.22	5.39
ROA	882	3.89	6.44	−33.05	30.77
ROE	881	12.44	46.45	−490.48	350.00
NetProMargin	842	6.43	17.03	−159.22	176.10
SlsGrwth	697	4.37	20.90	−100.00	131.86
Effcncy	849	100.59	75.14	0	475.47
BrdGenDiv	886	14.10	13.46	0	66.67
BrdIndep	886	73.21	20.07	0	100
BrdSize	886	9.56	3.03	2	20
FrFlPer	876	70.82	25.93	0	100
LnTotAssets	887	22.07	1.38	17.59	26.53
Lvrage	887	59.30	21.89	0.22	160.55
			Category	Frequency	Percent
BrdAtten			Not exist	651	73.31
			Exist	237	26.69
			Total	888	100
DualCEO			Not exist	523	58.90
			Exist	365	41.10
			Total	888	100

were lowly/moderately correlated with *BrdGenDiv*, *BrdIndep*, *DualCEO*, and *FrFlPer* at a 0.05 significance level. Further, while *TobinQ* was positively correlated with *BrdAtten*, it was negatively correlated with *LnTotAssets* ($p < .05$). Also, *ROE* was positively correlated with *BrdSize* and *LnTotAssets* ($p < .05$). Additionally, *NetProMargin* and *BrdSize*, *SlsGrwth* and *BrdIndep*, and *Effcncy* and *BrdGenDiv* were positively correlated ($p < .05$). Finally, while *NetProMargin* and *BrdGenDiv–BrdIndep* were positively correlated, *Effcncy* and *BrdSize–LnTotAssets* were negatively correlated ($p < .05$).

5.3. Empirical results

The dynamic first-order model presented above was analyzed using the system GMM to obtain consistent and unbiased estimates. The GMM estimators were developed in a series of papers, including (but not limited to) [Holtz-Eakin et al. \(1988\)](#), [Arellano and Bond \(1991\)](#), and [Blundell and Bond \(1998\)](#). The current study implemented a two-step system GMM analysis with the Windmeijer finite sample correction technique. In line with [Windmeijer \(2005\)](#) and [Roodman \(2009\)](#), while the study generated the GMM-type instruments using the lagged dependent variables, the standard instruments were created considering all other explanatory variables. The study only considered the second-order econometric model for the CFP variable, *ROA*, in parallel with [Wintoki et al. \(2012\)](#).

The results, using GMM analysis, confirmed that none of the second-order serial correlation probabilities (AR(2) p -value) were significant at the 5% level. Likewise, the Hansen test p -values were also insignificant at the 5% level. Both tests demonstrated the validity of the chosen instrument set—the instruments were correctly specified.

[Table 4](#) shows a positive and statistically significant link between CFP, including *ROA* (p -value < 0.1), *ROE* (p -value < 0.01), *NetProMargin* (p -value < 0.05), and *SlsGrwth* (p -value < 0.05), with *BrdIndep*. However, board gender diversity and CEO and CFP were not significantly associated. Therefore, Hypothesis 2 was accepted (for four of the six CFP variables), whereas Hypothesis 1 and Hypotheses 3a and 3b were not supported.

Next, the moderating effect of firm size (*LnTotAssets*) between the CFP and CG variables, including *BrdGenDiv*, *BrdIndep*, and *DualCEO*, was considered. The system GMM regression outcomes are presented in [Table 5](#) for smaller firms (*LnTotAssets—Low*) and [Table 6](#) for larger firms (*LnTotAssets—High*). Again, both the second-order serial correlation probabilities (AR(2) p -value) and the Hansen test p -values were all insignificant at the 5% level. All of the previous substantiated relationships for the full sample lost their significance for smaller firms. However, for larger firms, a positive and significant relation was found between *SlsGrwth* (p -value < 0.05) and *BrdGenDiv*. Further, a positive and significant relation was found between *ROA* (p -value < 0.01), *ROE* (p -value < 0.1), and *NetProMargin* (p -value < 0.01) with *BrdIndep*. Also, a significant link was found between *SlsGrwth* and *DualCEO* (p -value < 0.05). Hence, Hypothesis 4, which concerned the moderating function of firm size between BS and CFP, was supported.

Finally, the moderating role of leverage (*Lvrage*) between BS and CFP was examined. The system GMM regression was run, the results of which are displayed in [Table 7](#) for low-leverage firms (*Lvrage—Low*) and [Table 8](#) for high-leverage firms (*Lvrage—High*). Yet again, both the AR(2) p -values and the Hansen test p -values were all insignificant at the 5% level, thus rejecting the null hypothesis. The results illustrated no significant relationship for low-leverage firms. However, for high-leverage firms, the results confirmed a significant link between *ROA* and *BrdIndep* (p -value < 0.1). Hence, Hypothesis 5, which concerned the disciplinary role of leverage, was weakly supported, as it appeared to strengthen the role of independent directors in CFP. However, no effect of leverage on the role of female directors and CEO duality in improving CFP was found.

5.4. Robustness analysis

To test the robustness of the base results (presented in [Table 4](#)) for alternative methodologies, a panel-corrected Prais–Winsten regression was run, in line with [Bonoli \(2013\)](#) and [Shahbaz et al. \(2020\)](#). The Prais–Winsten regression results are summarized in [Table 9](#). The p -values of the Prais–Winsten regression chi-square statistics were significant at the 0.01 level. The regression explained the variance in the CFP variables from 4% to 35%. The results confirmed a positive and significant relationship between *ROA* (p -value < 0.05), *NetProMargin* (p -value < 0.01), and *SlsGrwth* (p -value < 0.01) with *BrdIndep* (p -value < 0.01). Hence, the base results were robust to alternative methodologies. It should be noted, however, that the robustness test produced superior results for CFP, including the relation between *TobinQ* (p -value < 0.05), *ROA* (p -value < 0.05), and *Effcncy* (p -value < 0.1) with *BrdGenDiv*. Moreover, the results validated the association of *BrdIndep* with *TobinQ* (p -value < 0.01) and *DualCEO* with *TobinQ* (p -value < 0.05). Incrementally, the Prais–Winsten regression revealed a positive relation between *BrdGenDiv* and *TobinQ*, *ROA*, and *Effcncy*, as well as a positive influence of *BrdIndep* and *DualCEO* on *TobinQ*.

6. Discussion and conclusion

Although prior studies examined the association between BS and CFP in other sectors, no investigation of this association for the logistics sector at the global level has yet been undertaken. Moreover, previous investigations generally focused on two performance metrics—Tobin's Q and ROA—and thereby generated only limited insights into CFP. This study utilized, in addition to the cited two indicators, several other CFP metrics to capture different aspects of CFP, which were categorized into three broad categories: firm value, profitability, and sales performance. In addition, although the role of female directors in environmental and social performance has been well explored in the logistics sector ([Fernandes et al., 2023](#); [Kuzey et al., 2022](#)), their role in CFP in the logistics sector has as of yet not been sufficiently explored. Furthermore, the study generated, based on two moderation analyses employing firm size and leverage, important insights into and implications of the association between BS and CFP depending on varying levels of firm size and leverage. Hence, by relying on agency and contingency theories, the study provides several unique contributions to both the logistics

Table 3
Spearman's correlation coefficients.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 TobinQ	1													
2 ROA	0.6572*	1												
3 ROE	0.5868*	0.8110*	1											
4 NetProMargin	0.4983*	0.7732*	0.6434*	1										
5 SlsGrwth	0.1623*	0.1693*	0.1865*	0.0967*	1									
6 Efficncy	0.1972*	0.2968*	0.2881*	-0.2540*	0.1000*	1								
7 BrdGenDiv	0.2742*	0.2935*	0.3496*	0.1769*	0.0515	0.1503*	1							
8 BrdIndep	0.3360*	0.2621*	0.2983*	0.2260*	0.0820*	0.0237	0.4696*	1						
9 BrdSize	0.0141	0.1023*	0.2202*	0.1679*	-0.018	-0.0767*	0.0784*	0.1094*	1					
10 BrdAtten	0.0884*	0.0672	-0.0462	0.0829*	0.0195	-0.0811*	0.0742	-0.0249	-0.2113*	1				
11 DualCEO	0.1664*	0.1103*	0.0987*	0.0651	0.0337	0.0666	-0.0468	0.1331*	0.0764*	-0.2558*	1			
12 FrFlPer	0.3091*	0.2923*	0.2939*	0.2203*	-0.0332	0.0861*	0.3337*	0.2175*	0.0276	-0.0158	0.1788*	1		
13 LnTotAssets	-0.0754*	-0.0119	0.1416*	0.0961*	-0.0177	-0.1744*	0.1178*	0.0013	0.5202*	-0.1982*	-0.0374	0.1171*	1	
14 Lvrage	-0.1085*	-0.2145*	0.0423	-0.2760*	-0.0512	0.1110*	0.0562	0.1005*	0.1181*	-0.1051*	-0.1076*	0.0367	0.2616*	1

* Significance level: 0.05.

Table 4
Base Analysis - System GMM estimates.

Variables	TobinQ	ROA	ROE	NetProMargin	SlsGrwth	Effcncy
FirmPerf (t-1)	0.85 ^{***} (7.87)	0.31 ^{***} (5.25)	-0.34 ^{***} (-3.49)	0.25* (1.70)	0.15 (1.60)	0.69 ^{**} (2.51)
FirmPerf (t-2)		0.24 ^{***} (4.23)				
BrdGenDiv	0.0012 (0.63)	0.0071 (0.32)	0.28 (1.41)	-0.036 (-0.51)	-0.019 (-0.22)	0.14 (0.40)
BrdIndep	0.00078 (0.71)	0.019* (1.68)	0.25 ^{***} (3.00)	0.090 ^{**} (2.14)	0.097 ^{**} (2.16)	-0.089 (-0.56)
DualCEO	0.017 (0.44)	0.67 (1.25)	-0.73 (-0.18)	-0.58 (-0.37)	0.41 (0.22)	-0.46 (-0.09)
BrdSize	0.0038 (0.66)	0.065 (0.89)	0.63 (0.83)	0.52* (1.84)	0.26 (0.50)	0.76 (0.83)
BrdAtten	0.069* (1.84)	0.70 (0.98)	-3.90 (-0.85)	4.01 ^{**} (2.34)	-1.92 (-1.05)	-4.40 (-0.70)
FrFlPer	0.0013 (1.49)	0.0068 (0.71)	0.13 (1.49)	0.052 (1.46)	0.036 (0.75)	0.054 (0.57)
LnTotAssets	0.00025 (0.02)	0.14 (0.67)	1.69 (0.76)	1.68 ^{**} (2.38)	0.32 (0.25)	-4.69 (-0.80)
Lvrage	-0.00090 (-1.02)	-0.021 (-1.07)	-0.093 (-0.54)	-0.093 ^{**} (-2.61)	-0.051 (-0.85)	0.29 (0.94)
Constant	0.026 (0.07)	-4.18 (-0.99)	-45.7 (-1.00)	-43.1 ^{**} (-2.33)	-13.3 (-0.52)	113.0 (0.80)
No. of obs.	723	586	716	687	563	696
Firm/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-test <i>p</i> -value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
AR(2) <i>p</i> -value	0.586	0.137	0.580	0.947	0.798	0.742
Hansen test <i>p</i> -value	0.356	0.381	0.134	0.144	0.282	0.425

*** $p < .01$; ** $p < .05$; * $p < .10$; Std. err. in parentheses.

Table 5
Moderation Analysis - System GMM estimates (*LnTotAssets* = Low).

Variables	TobinQ	ROA	ROE	NetProMargin	SlsGrwth	Effcncy
FirmPerf (t-1)	0.92 ^{***} (8.51)	0.46 ^{**} (2.24)	-0.43 ^{***} (-4.09)	0.20 (1.17)	0.047 (0.34)	0.59 ^{**} (2.39)
FirmPerf (t-2)		0.43 ^{***} (2.82)				
BrdGenDiv	0.0012 (0.68)	-0.017 (-0.36)	0.36 (0.73)	0.11 (0.69)	-0.17 (-0.56)	0.23 (0.77)
BrdIndep	0.00060 (0.27)	-0.028 (-0.49)	-0.011 (-0.03)	0.14 (1.42)	0.17 (0.95)	0.075 (0.25)
DualCEO	-0.0014 (-0.03)	1.06 (1.12)	2.90 (0.42)	2.60 (0.92)	-3.78 (-0.75)	8.91 (0.68)
BrdSize	-0.00014 (-0.02)	-0.28 (-1.10)	0.91 (0.35)	0.68 (1.58)	0.61 (0.42)	0.77 (0.37)
BrdAtten	0.064 (1.15)	-0.29 (-0.24)	-2.25 (-0.23)	6.53 (1.50)	-1.80 (-0.39)	-3.08 (-0.39)
FrFlPer	0.0011 (0.71)	-0.00061 (-0.03)	0.054 (0.28)	-0.058 (-0.45)	0.15 (0.81)	0.10 (0.50)
Lvrage	-0.000038 (-0.05)	-0.0035 (-0.21)	-0.31 (-0.96)	-0.015 (-0.37)	-0.095 (-1.10)	0.67 (1.31)
Constant	0.050 (0.22)	3.25 (0.46)	21.6 (0.60)	-9.85 (-0.86)	-20.0 (-0.86)	-26.9 (-1.03)
No. of obs.	278	214	275	262	206	270
Firm/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-test <i>p</i> -value	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001
AR(2) <i>p</i> -value	0.116	0.143	0.120	0.108	0.224	0.221
Hansen test <i>p</i> -value	0.073	0.441	0.163	0.470	0.207	0.518

*** $p < .01$; ** $p < .05$; * $p < .10$; Std. err. in parentheses.

literature and the general CG literature. First, larger firms may have greater resources to implement best practices of CG and to mobilize for marketing their products, which may reinforce the link between BS and CFP (Ariff et al., 2007; Zona et al., 2013). Second, although leverage may increase the potential for firm failure, it may also have a disciplinary effect on managerial behavior and

Table 6
Moderation Analysis - System GMM estimates ($LnTotAssets = High$).

Variables	TobinQ	ROA	ROE	NetProMargin	SlsGrwth	Effcncy
FirmPerf (t-1)	0.69 ^{***} (4.55)	0.20 (1.57)	0.35 (1.25)	-0.058 (-0.90)	0.16* (1.74)	0.92 ^{***} (20.58)
BrdGenDiv	-0.000068 (-0.02)	0.0030 (0.12)	0.14 (1.43)	-0.094 (-0.78)	0.14 ^{**} (2.12)	0.044 (0.77)
BrdIndep	0.0036 (1.63)	0.058 ^{***} (2.82)	0.13* (1.77)	0.16 ^{***} (2.92)	-0.015 (-0.45)	-0.039 (-1.24)
DualCEO	0.047 (0.51)	0.37 (0.52)	2.45 (0.80)	-1.91 (-0.75)	3.17 ^{**} (2.09)	0.071 (0.04)
BrdSize	0.0089 (0.86)	0.15 ^{**} (2.00)	0.73 (1.52)	0.99* (1.71)	0.083 (0.36)	0.29 (1.18)
BrdAtten	-0.0089 (-0.08)	0.81 (0.93)	5.14 (1.35)	3.33 (1.17)	2.12 (0.94)	-0.66 (-0.34)
FrFlPer	0.0028* (1.71)	0.019 (1.57)	0.035 (0.76)	0.14 ^{***} (3.16)	-0.057* (-1.98)	-0.028 (-1.00)
Lvrage	-0.0034 (-1.66)	-0.082 ^{***} (-3.82)	-0.039 (-0.42)	-0.15 ^{**} (-2.30)	0.025 (0.38)	-0.032 (-0.79)
Constant	-0.045 (-0.19)	0.39 (0.20)	-12.9 (-1.38)	-14.1 (-1.57)	-0.24 (-0.04)	10.0 (1.47)
No. of obs.	445	444	441	425	357	426
Firm/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-test <i>p</i> -value	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001
AR(2) <i>p</i> -value	0.460	0.294	0.242	0.369	0.255	0.457
Hansen test <i>p</i> -value	0.118	0.182	0.089	0.132	0.320	0.091

*** $p < .01$; ** $p < .05$; * $p < .10$; Std. err. in parentheses.

Table 7
Moderation Analysis - System GMM estimates ($Lvrage = Low$).

Variables	TobinQ	ROA	ROE	NetProMargin	SlsGrwth	Effcncy
FirmPerf (t-1)	0.80 ^{***} (4.90)	0.51 ^{***} (3.07)	0.21 (1.00)	0.26 (1.00)	0.28 ^{**} (2.45)	0.83 ^{***} (10.93)
FirmPerf (t-2)		0.33 ^{***} (3.02)				
BrdGenDiv	0.0024 (0.89)	0.012 (0.41)	0.11 (1.23)	0.062 (0.55)	-0.085 (-0.49)	0.098 (0.79)
BrdIndep	0.0013 (0.73)	-0.0013 (-0.10)	0.038 (0.50)	0.015 (0.21)	0.10 (1.07)	-0.080 (-0.96)
DualCEO	0.071 (1.33)	0.38 (0.58)	2.05 (0.99)	1.32 (0.34)	1.43 (0.37)	-0.038 (-0.01)
BrdSize	0.012 (1.16)	0.074 (0.32)	1.30 ^{***} (2.79)	0.84* (1.97)	1.47 (1.23)	0.79 (1.28)
BrdAtten	0.028 (0.64)	0.095 (0.12)	-0.73 (-0.30)	2.51 (0.82)	-3.56 (-1.03)	-2.61 (-0.90)
FrFlPer	0.00087 (0.72)	-0.0086 (-0.44)	0.077 (1.64)	0.039 (0.68)	0.13* (1.75)	0.028 (0.52)
LnTotAssets	-0.0055 (-0.22)	-0.14 (-0.39)	1.12 (1.00)	2.03 (1.61)	1.33 (0.62)	-0.41 (-0.31)
Constant	0.070 (0.13)	2.20 (0.23)	-34.8 (-1.33)	-52.2* (-1.73)	-58.9 (-1.31)	23.4 (0.75)
No. of obs.	347	278	347	331	269	340
Firm/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-test <i>p</i> -value	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001
AR(2) <i>p</i> -value	0.414	0.167	0.349	0.768	0.334	0.949
Hansen test <i>p</i> -value	0.118	0.607	0.712	0.507	0.304	0.223

*** $p < .01$; ** $p < .05$; * $p < .10$; Std. err. in parentheses.

decision-making since the debt repayment obligation attenuates the agency costs of free cash flow (Durand et al., 2016; King et al., 2021). Thus, we posit that increasing the level of leverage and associated contractual obligations might be useful in leveraging board capital for better CFP.

The results revealed that female directors are not influential in improving the CFP of firms in the logistics sector. We found some evidence of a positive role of female directors in enhancing CFP—but only in the robustness test. Evidence in prior empirical research for the relationship between women on boards and CFP is not unanimous, as several studies produced positive (Erhardt et al., 2003; Liu

Table 8
Moderation Analysis-System GMM estimates (*Lvrage* = High).

Variables	TobinQ	ROA	ROE	NetProMargin	SlsGrwth	Effcncy
FirmPerf (t-1)	1.10 ^{***} (7.50)	0.22* (1.96)	0.090 (0.28)	0.33 ^{***} (12.43)	0.0092 (0.05)	0.88 ^{***} (10.92)
FirmPerf (t-2)		0.18 ^{***} (2.91)				
BrdGenDiv	-0.0017 (-1.32)	0.011 (0.38)	0.068 (0.24)	-0.012 (-0.14)	0.091 (1.26)	0.18 (0.85)
BrdIndep	-0.00070 (-0.57)	0.036* (1.99)	0.20 (1.25)	0.054 (1.18)	0.023 (0.60)	0.0036 (0.06)
DualCEO	-0.040 (-1.35)	0.047 (0.06)	16.4 (1.12)	2.73 (1.39)	2.23 (0.78)	-2.10 (-0.64)
BrdSize	0.0100* (1.92)	0.0048 (0.06)	2.70 (1.27)	-0.23 (-0.83)	-0.56 (-1.13)	-0.066 (-0.11)
BrdAtten	0.088* (1.98)	2.57 ^{***} (3.24)	11.3 (1.44)	3.00 ^{***} (2.66)	0.40 (0.23)	1.40 (0.32)
FrFlPer	0.00041 (0.53)	0.025* (1.75)	0.14 (0.77)	0.023 (0.75)	-0.081* (-1.90)	0.043 (0.37)
LnTotAssets	0.0050 (0.47)	0.074 (0.27)	3.01 (0.88)	1.39 (1.55)	0.85 (0.79)	-1.46 (-0.67)
Constant	-0.25 (-0.96)	-5.70 (-0.93)	-136.8 (-1.46)	-33.4 (-1.53)	-11.4 (-0.53)	40.6 (0.87)
No. of obs.	376	308	369	356	294	356
Firm/Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-test <i>p</i> -value	<0.001	<0.001	<0.001	<0.001	<0.01	<0.001
AR(2) <i>p</i> -value	0.610	0.376	0.315	0.458	0.468	0.778
Hansen test <i>p</i> -value	0.454	0.562	0.589	0.454	0.119	0.056

*** $p < .01$; ** $p < .05$; * $p < .10$; Std. err. in parentheses.

Table 9
Robustness Analysis-Prais-Winsten regression estimates.

Variables	TobinQ	ROA	ROE	NetProMargin	SlsGrwth	Effcncy
BrdGenDiv	0.0045 ^{**} (2.25)	0.045 ^{**} (1.96)	-0.018 (-0.09)	-0.039 (-0.68)	-0.11 (-1.60)	0.35* (1.89)
BrdIndep	0.0042 ^{***} (3.35)	0.031 ^{***} (2.03)	0.092 (0.89)	0.11 ^{***} (3.13)	0.12 ^{***} (2.83)	-0.26 ^{**} (-2.27)
DualCEO	0.10 ^{**} (1.97)	0.58 (1.04)	5.83 (1.45)	-1.79 (-1.02)	0.019 (0.01)	3.17 (0.72)
BrdSize	0.013 (1.27)	0.100 (1.07)	0.081 (0.08)	0.41 (1.28)	0.045 (0.13)	0.26 (0.35)
BrdAtten	0.029 (0.82)	0.75 (1.48)	0.21 (0.04)	2.42* (1.66)	-1.10 (-0.57)	-0.79 (-0.25)
FrFlPer	0.0040 ^{***} (2.93)	0.021* (1.86)	0.18 ^{**} (2.38)	0.053 (1.52)	0.057 (1.52)	0.12 (1.19)
LnTotAssets	-0.067 ^{**} (-2.23)	0.55 ^{**} (2.06)	3.99* (1.88)	2.79 ^{***} (4.16)	0.99 (1.21)	-16.0 ^{***} (-4.82)
Lvrage	-0.0068 ^{***} (-4.40)	-0.083 ^{***} (-4.64)	-0.021 (-0.10)	-0.17 ^{***} (-2.87)	-0.081* (-1.78)	0.57 ^{***} (4.10)
Constant	2.26 ^{***} (3.40)	0 (.)	-91.7 ^{**} (-2.23)	0 (.)	-25.6 (-1.42)	0 (.)
No. of obs.	872	869	868	835	693	842
χ^2	141.38	362.41	36.42	222.21	143.34	989.22
χ^2 <i>p</i> -value	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001
R ²	0.28	0.11	0.04	0.08	0.15	0.35

*** $p < .01$; ** $p < .05$; * $p < .10$; Std. err. in parentheses.

et al., 2014; Kılıç & Kuzey, 2016; Duppati et al., 2020), while others generated insignificant (Farrell & Hersch, 2005; Marinova et al., 2016) or even negative (Reguera-Alvarado et al., 2017; Shehata et al., 2017) results on the association between board gender diversity and CFP. These inconsistent findings suggest that the role of women in CFP might not be straightforward or an outcome of contingencies. For example, female directors might be more influential in contexts in which shareholder protection is better and gender parity is more prevalent in society (Post & Byron, 2015). Besides, sectoral contingencies might play a role in empowering female directors. For example, while board gender diversity reinforces CFP in the hospitality and tourism sectors (Russen et al., 2021), as well

as in the healthcare sector (Uyar et al., 2021b), it weakens CFP in the energy sector (Shahbaz et al., 2020). Thus, our findings provide evidence that the monitoring role of female directors in the logistics sector must be strengthened in the interest of improving CFP.

However, independent directors *do* predict CFP in the logistics sector. The role of independent director in CFP was further confirmed with the robustness test. Although some studies generated insignificant (Goh et al., 2014) or negative (Dang et al., 2018; Shan, 2019) findings on the association between board independence and CFP, most studies have documented a positive association (Barnhart et al., 1994; Lefort & Urzúa, 2008; Lei & Song, 2012; Liu et al., 2015; Hamdan & Al Mubarak, 2017; Uribe-Bohorquez et al., 2018). Hence, these findings support the positive role of independent directors in reducing agency costs (Mobbs, 2013) in that they help resolve conflicts between managers and shareholders (Agrawal & Knoeber, 1996), restrain the self-interested activities of management (Agrawal & Knoeber, 1996), and limit the hegemony of dominant shareholders (Goh et al., 2014). Despite the growing percentage of independent directors on boards, particularly since the passage of the Sarbanes-Oxley Act of 2002,⁵ their true independence from owners and objective participation in decision-making processes are discussed in the literature (Chintrakarn et al., 2022). Hence, we explored their contribution to CFP in the logistics sector.

Moreover, CEO duality appeared to have no significant role in either improving or weakening CFP. Although the theoretical section highlighted the performance-enhancing and performance-weakening role of CEO duality by drawing on stewardship and agency theories, respectively, we found no empirical evidence in support of these arguments. The empirical results of past studies are dichotomous; while Bhagat and Bolton (2008) and Dang et al. (2018) documented a negative link between CEO duality and CFP, Peni (2014) and Ahmadi et al. (2018) demonstrated a positive relationship between the two variables. Although CEO duality enhances CFP in some sectors, such as hospitality (Guillet et al., 2013), our insignificant findings are in line with those of several previous studies in different sectors, such as energy (Uyar et al., 2021a), healthcare (Uyar et al., 2021b), and banking (Carty & Weiss, 2012). Thus, as the implications of CEO duality may change from one sector to another, we were motivated to test the effect of CEO duality in the logistics sector.

The first moderation analysis concerning firm size indicated that women drive CFP in neither smaller nor larger firms—with one exception: They *do* improve firm sales growth in larger firms. Besides, it was clearly observable in the moderation analysis that independent directors are a driver of firm profitability in larger firms, whereas they are not a driver of CFP in smaller firms. Lastly, CEO duality is influential only concerning sales growth in large firms, not smaller firms. Thus, the results confirmed that contingencies have an effect on strengthening the role of the board in CFP (Birkinshaw et al., 2002; Carter et al., 2010). Specifically, it appears that larger companies benefit more from stronger boards, likely due to having greater market power and higher efficiency gains (Lee, 2009). In summary, this moderation analysis confirmed that board characteristics impact firm outcomes depending on the contexts in which they operate (Zona et al., 2013).

The second moderation analysis revealed that indebtedness is not a channel through which BS strengthens or weakens CFP. This is because the role of independent and female directors, as well as that of CEOs with dual roles, is largely not influential in either high-leverage firms or low-leverage firms, with the only exception being that independent directors can improve ROA in high-leverage firms. Therefore, leverage was ultimately shown not to be a significant moderator between BS and CFP in the logistics sector, although it has been suggested in the literature that leverage is one of several disciplinary mechanisms (Grinstein, 2006) that can be used to mitigate agency problems between stockholders and managers (Agrawal & Knoeber, 1996; De Jong, 2002). This finding may warrant further investigations that incorporate institutional characteristics, such as the regulatory environment or financial sector developments, in terms of their potential disciplinary role (as forms of leverage) in firms.

7. Implications, limitations, and prospective research avenues

This study has several important implications for the logistics sector. The weaker impact of female directors than independent directors on CFP might be attributable to the smaller percentage of women on boards in the logistics sector. Currently, as the descriptive statistics showed, women constitute 14.10% of boards in this sector, whereas independent directors comprise 73.21%. Given that the employment and board membership of women in transport and logistics companies is extremely low compared to other sectors (Govindan et al., 2021; Shakil et al., 2022), and considering that gender inequality has been found to be harmful for logistics performance (Larson, 2020), our findings suggest that more space should be allocated to women, particularly as female directors, in boardrooms and that they should be empowered with sufficient autonomy to have a measurable, positive impact on firm outcomes. The findings also indicate that the logistics sector should review the roles it currently allocates to female directors—Are they, for example, recruited only for “window-dressing”? Are they given responsibility only for CSR activities? Or, in contrast, are they assigned to core board committees with the goal of making a tangible impact on corporate decisions? Professional media covering the transportation and logistics sectors have also drawn attention to the low proportion of females in these sectors and have recommended promoting female board membership as a remedy (Women in Transport, 2023). Thus, the findings suggest that logistics firms should recruit qualified female board members and empower them with the autonomy needed to truly be impactful. Furthermore, the strong influence of independent directors on all performance indicators demonstrated their contribution to the monitoring and controlling functions of firms in the sector. Considering these findings, firms with a smaller ratio of independent directors should review and—if necessary—reshape their boardrooms by recruiting more independent directors with the necessary skills and qualifications. In other words, these results may help firms better balance the proportion of insider and outsider directors to enhance board efficacy.

⁵ The Sarbanes-Oxley Act mandates firms to have a majority of independent directors on their board.

Moreover, CEO duality was shown to not benefit the logistics sector. Thus, assigning a dual role to one person might give them excessive power or overload them with work tasks with different responsibilities, consequently making them less efficient in decision-making. In addition, the moderation analyses yielded evidence that independent directors, not female directors, are better monitors in larger firms and more helpful in improving CFP. This might be because larger firms are more complex and, hence, the skills and abilities of independent directors might be more observable in larger firms. On the contrary, little difference between the monitoring function of directors in low- and high-leverage firms was found, and thus the disciplinary role of leverage on these directors in logistics firms was not validated. This finding implies that other factors may impact the disciplinary role of leverage on directors. For example, rather than board composition, board functioning, committees, policies, and meetings might play a role in leveraging the disciplinary effect of debt on CFP. Thus, further studies could explore the moderating effect of these factors between board composition and CFP in high-leverage firms.

Theoretically speaking, a main implication of this study is that while independent directors play a significant role in alleviating agency conflicts between managers and shareholders by improving CFP, female directors do not. Moreover, the neutral role of CEO duality in CFP confirmed tenets of neither agency nor stewardship theory. In addition to this main effect, contingencies were shown to have a partial effect on the monitoring role of directors, in terms of driving firm outcomes, thereby supporting contingency theory. Larger firms benefit more from independent directors than female directors. Independent directors might prevent the exploitation of firm resources by free-rider managers, especially in larger firms. The insignificance of board diversity to CFP in both smaller and larger firms casts doubt on the proportion, efficacy, empowerment, or skills and experiences of women in boardrooms in the logistics sector. Hence, boards and chairmen alike should determine what underlies this lack of significance and find ways to reap greater benefits from board diversity. Nevertheless, leverage, as another contingency proxy and presumed disciplinary factor of directors, was not validated, which suggests that further investigations should be conducted by, for example, decomposing total debt into sub-categories depending on the type or maturity.

Finally, our findings have several policymaking implications. National CG codes or governmental regulations are influential in strengthening the monitoring ability and composition of boards of directors. These codes and regulations oblige firms to meet a specified quota of independent and/or female directors on their boards. For example, Norway imposed gender quotas on boards in 2003, demanding that firms have at least 40% female directors by 2008 (Yu & Madison, 2021). Likewise, other European Union countries, such as Belgium, Spain, and France, have enacted similar regulations, which helped these countries achieve 23.3% board diversity in 2016, compared to 9% in 2003 (Yu & Madison, 2021). Another example is the Transport Infrastructure Skills Strategy issued by the UK government, which is aimed at achieving a gender-balanced employment strategy by 2030 in the transportation sector (STAT, 2020). Given that the logistics sector is crucial for the competitiveness of other sectors, such as manufacturing, agriculture, and tourism (Barut et al., 2023), for attracting foreign direct investment (Hong, 2007; Suki et al., 2021), and for economic growth (Khan et al., 2019; Kabak et al., 2020), strengthening the internal governance mechanisms of the logistics sector via CG codes and public regulations will promote national economic development as well as organizational performance.

As the sample employed in this study consisted of only publicly traded logistics companies, the findings might not be directly generalizable to other sectors or to non-listed logistics firms. This limitation, however, provides opportunities for future studies on these types of firms, especially in consideration of their particularities. The results suggest several other future research avenues. For instance, future research could explore which qualifications of female and independent directors (if data exist) yield positive firm outcomes. Other potential firm-level and institutional factors could be employed as moderators, which might generate interesting results. Among such potential moderators are other contextual factors, like firm-level board policies, ownership structures of firms, country-level infrastructure, or institutional quality. For example, future studies could examine how boards function under various ownership structures, like institutional ownership or family ownership, or explore whether infrastructure and/or institutional quality strengthen the connection between BS and CFP. Finally, the disciplinary effects of leverage might vary depending on national financial sector development and regulatory quality, both of which warrant separate investigations.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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